KRAV

1. A method for performing admission control in order to offer assurances on forwarding quality in networks comprising setting a threshold for each link where said threshold defines a maximum sum of forwarding resources requested by applications for their application data flows, ADFs, on the link, **characterised by** choosing the level of said threshold by utilising knowledge about multiplexing properties of the ADFs on each link and by utilising knowledge about the forwarding resources of the links.

2. A method according to claim 1, **characterised by** the further step of utilising knowledge about the traffic mix of different ADFs on each link when choosing the levels of said thresholds.

3. A method according to any one of the preceding claims, **characterised by** estimating multiplexing properties of different ADFs off-line, said estimation being based on results from preparatory tests of recorded samples of ADFs, which are expected on a link and use this estimation when choosing the level of said threshold.

4. A method according to claim 3, **characterised by** further using assumptions on user behaviour and application configurations for the estimation.

5. A method according to any one of the claims 1-2, **characterised by** setting an initial threshold for each link and repeatedly, during usage, measuring multiplexing properties of aggregated ADFs online on each link and use these measurements to dynamically adapt said thresholds during usage.

6. A method according to claim 5, **characterised by** choosing the initial threshold in the same way as the threshold is chosen in any one of the claims 3-4.

7. A method according to claim 5 or 6, **characterised by** performing the measurements at at least two different rates.

8. A method according to claim 7, **characterised by** measuring at a first rate, which is equal to or lower than the amount of allocated resources on the link and measuring at a second rate, which is lower than the first rate

9. A method according to claim 8, wherein the second rate is dependent on the reserved resources on the link and the threshold.

10. A method according to any one of the claims 7-9, **characterised by**
- increasing the threshold when both the measurement at the first and second rates indicate lower loss-rates than what is assured;
- decreasing the threshold when both the measurement at the first and second rates indicate higher loss-rates than what is assured; and
- maintaining the threshold when the measurement at the second rate indicates higher loss-rate than assured and the measurement at the first rate indicates lower loss-rate than assured.

11. A method according to any one of the claims 5-10, **characterised by** introducing a measurement threshold, which defines a level of forwarding capacity reservations on the link above which the measurements are initiated.

12. A method according to claim 11, **characterised by** increasing the measurement threshold in steps but not over a predefined maximum level which is lower than the level of allocated resources of the link when the measurement at the second rate indicates higher loss-rate than assured and the measurement at the first rate indicates lower loss-rate than assured.

13. A method according to claim 8 and any one of the claims 5-12, **characterised by** measuring at a third rate, which is higher than the first rate but equal to or

lower than the allocated resources of the link when the measurement at the first rate indicates a higher loss rate than assured, the loss rate measured at the third rate being indicative of if it is necessary to pre-empt ADFs from the link or if it is enough to prevent new ADFs from entering the link.

14. A node in a network comprising software for performing admission control in order to offer assurances on forwarding quality in networks and software for setting a threshold for each link, said threshold defining a maximum sum of forwarding resources requested by applications for their application data flows, ADFs, on the link, **characterised in that** said node further comprises software for performing the method in any one of the claims 1-13.

15. A node in a network according to claim 14, **characterised in that** it comprises or is connectable to a measuring means adapted to perform the measurements on the links as defined in any one of the claims 5-13.

16. A computer program product directly loadable into the internal memory of a processing means within a computer placed in a node according to claim 14 or 15, comprising the software code means for performing the steps of any of the claims 1-13.

17. A computer program product stored on a computer usable medium, comprising readable program for causing a processing means in a computer placed in a node according to claim 14 or 15, to control an execution of the steps of any of the claims 1-13.

18. A node in a network, said node comprising admission controlling means (14;14') adapted to perform admission control in order to offer assurances on forwarding quality in networks, said admission controlling means (14;14') comprising threshold setting means (16;16') adapted to set a threshold for each link, said threshold defining a maximum sum of forwarding resources requested

by applications for their application data flows, ADFs, on the link, **characterised in that** said threshold setting means (16;16') further is adapted to utilise knowledge about multiplexing properties of the ADFs on each link and knowledge about forwarding resources of the link when choosing the level of said threshold.

19. A node according to claim 18, **characterised in that** the threshold setting means (16;16') further is adapted to utilise knowledge about the traffic mix of different ADFs on each link when choosing the levels of said thresholds.

20. A node according to claim 18 or 19, **characterised in that** the admission controlling means (14) comprises estimating means (18) connected to the threshold setting means (16), said estimating means (18) being adapted to retrieve results from preparatory tests of recorded samples of ADFs expected on a link and estimate multiplexing properties of these ADFs off-line, said estimating means (18) further being adapted to forward the estimation to the threshold setting means (16), which is adapted to use the estimation for choosing the level of said threshold.

21. A node according to claim 20, **characterised in that** the estimating means (18) further is adapted to use assumptions on user behaviour and application configurations for the estimation.

22. A node according to claim 18 or 19, **characterised in that** the threshold setting means (16') is adapted to set an initial threshold for each link and **in that** the admission controlling means (14') comprises a measurement requesting means (20), which is connected to the threshold setting means (16') and adapted to retrieve measurements from a measuring means (22) in the network, which is adapted to repeatedly, during usage, measure multiplexing properties of aggregated ADFs online on each link, and **in that** the threshold setting means

(16') is adapted to use these measurements to dynamically adapt the thresholds during usage.

23. A node according to claim 22, **characterised in that** the threshold setting means (16') is adapted to choose the initial threshold in the same way as the threshold is chosen in any one of the claims 20-21.

24. A node according to claim 22 or 23, **characterised in that** the measurement requesting means (20) is adapted to retrieve measurements performed at at least two different rates.

25. A node according to claim 24, **characterised in that** the measurement requesting means (20) is adapted to retrieve a measurement performed at a first rate, which is equal to or lower than the amount of allocated resources on the link and retrieve a measurement performed at a second rate, which is lower than the first rate.

26. A node according to claim 25, **characterised in that** the measurement requesting means (20) is adapted to retrieve a measurement performed at a second rate, which is dependent on the reserved resources on the link and the threshold.

27. A node according to any one of the claims 24-26, **characterised in that** the threshold setting means (16') is adapted to
- increase the threshold when both the measurement at the first and second rates indicate lower loss-rates than what is assured;
- decrease the threshold when both the measurement at the first and second rate indicate higher loss-rates than what is assured; and
- maintaining the threshold when the measurement at the second rate indicates higher loss-rate than assured and the measurement at the first rate indicates lower loss-rate than assured.

28. A node according to any one of the claims 22-27, **characterised in that** the measurement requesting means (20) comprises a measurement threshold means (24) adapted to define a level of forwarding capacity reservations on the link above which the measurements should be requested.

29. A node according to claim 28, **characterised in that** the measurement threshold means (24) is adapted to increase the measurement threshold in steps but not over a predefined maximum level which is lower than the level of allocated resources of the link when the measurement at the second rate indicates higher loss-rate than assured and the measurement at the first rate indicates lower loss-rate than assured.

30. A node according to claim 25 and any one of the claims 22-29, **characterised in that** the measuring requesting means (20) is adapted to retrieve a measurement at a third rate, which is higher than the first rate but equal to or lower than the allocated resources on the link when the measurement at the first rate indicates a higher loss rate than assured, the loss rate measured at the third rate being indicative of if it is necessary to pre-empt ADFs from the link or if it is enough to prevent new ADFs from entering the link.